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THE AILING U.S. DEFENSE INDUSTRIAL
BASE: IS THE INDUSTRIAL MODERNIZATION
INCENTIVES PROGRAM (IMIP) THE ANSWER?

THESIS

David S. Glowacki
Captain, USAF

AFIT/GCM/LSY/88S-6

DEPARTMENT OF THE AIR FORCE
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Wright-Patterson Air Force Base, Ohio

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THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Contracting Management

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September 1988

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Abstract

The reluctance of the defense industry to modernize its manufacturing capabilities has caused a serious degradation of the defense industrial base. In an effort to revitalize the declining industrial base the DOD initiated the Industrial Modernization Incentives Program (IMIP). This program was designed to encourage defense contractors to modernize their facilities and equipment in return for additional contract incentives. The short term goal of this program is to reduce acquisition costs and lead times and improve quality levels through productivity gains. In addition, the long term goal of this program is to strengthen the defense industrial base to support surge and mobilization requirements.

Though the IMIP and its predecessor TECHMOD have been in existence since the late 1970's, a comprehensive evaluation methodology has not yet been developed. There have been several efforts to develop a comprehensive approach; however, they have all fallen short in constructing this necessary evaluation method. The major problem is that there are several subjective criteria that must be evaluated to determine the success of a program. This subjectivity has made it difficult to provide a comprehensive assessment of an IMIP project. Also, there are some cases where the improvement in one criterion may cause a degradation in another criterion.

This difficulty has lead to constant debate over the success of the IMIP. This research, however, is to designed to quell this on-going debate. The goal of this research is explore the perceptions of the "experts in the field" to determine the effectiveness of the IMIP and possible improvements to this program. Through a series of personal and telephone interviews with selected "experts", a comprehensive picture of the status of this program will be drawn. In addition, any problems that are inhibiting the success of this program will also be addressed.

Results of the survey revealed that the IMIP is a necessary program that is improving the industrial base. However, the program is of limited effectiveness due to the restricted scope of the current effort. Findings also indicate that the program should be centralized and procedures standardized as much as possible in order to provide for the efficient and effective allocation of the scarce financial resources necessary to improve our nation's defense industrial base.

THE AILING U.S. DEFENSE INDUSTRIAL BASE:
IS THE INDUSTRIAL MODERNIZATION INCENTIVES
PROGRAM (IMIP) THE ANSWER?

I. Introduction

General Issue

The defense industry suffers from insufficient capital investment, resulting in excessive touch labor and hence less than desired quality and productivity. This in turn leads to unduly high costs and reduced international competitiveness. These weaknesses exist throughout the prime and lower tiers of the industry [Correll, 1988:23-25].

This testimony was given to a Senate subcommittee on the defense industrial base by General Robert T. Marsh, USAF (Ret.), Chairman of the Air Force Association's Science and Technology Committee and former commander of Air Force Systems Command (AFSC). General Marsh's testimony succinctly addresses the serious situation facing our defense industrial base today.

Since the late 1970's defense industrial base issues have been among the hottest and most controversial defense-related topics. The declining industrial base and increased dependence on foreign sources of supply have far-reaching security implications. One example of this problem was illustrated in a Wall Street Journal article by Tim Carrington. According to the article, Pentagon strategists recently discovered that the Soviets could severely hamper

the U.S. war effort by simply bombing a small German plant thirty miles from the Czechoslovakian border. Apparently, this small facility supplies all the high-purity silicon the U.S. buys for computer chips used in thousands of missile guidance systems (Correll, 1988:20). This is a graphic example of how the weakened defense industrial base is jeopardizing our nation's security.

As a result of the perception that the industrial base was declining at an alarming rate, in 1980 the House Armed Services Committee convened the Defense Industrial Base Panel chaired by Representative Richard H. Ichord. This panel heard testimony from the defense industry and the Department of Defense (DOD). The panel confirmed the weakened state of our defense industrial base. Ichord warned "there has been a serious decline in the nation's defense industrial capability that places our national security in jeopardy" (U.S. Congress, 1980:2).

The "Ichord Report", as it became known, encouraged the DOD to place renewed emphasis on industrial base issues. DOD's primary response to the ailing defense industrial base was the Industrial Modernization Incentives Program (IMIP). This program was designed to encourage defense industry capital investment through contract incentives provided by the DOD. The short and long term objectives of the IMIP are as follows:

The short term objective is to reduce the costs and lead times and increase the quality of manufacturing

through productivity gains. The long term objective is to have a healthy industrial base to meet surge and mobilization requirements should a conflict/war arise [AFSC Review, 1986:1].

Now, six years after the initiation of the IMIP, the DOD has reported numerous successful projects, but the question remains, has the IMIP achieved its intended program objectives?

Specific Problem

It would appear initially that evaluation of these straightforward objectives is a relatively simple process; however, these simple objectives have many complex issues associated with them. As Cooper and Houck point out in their thesis, Measuring the Effectiveness of the Industrial Modernization Incentives Program (IMIP):

. . . the analysis of the Industrial Modernization Incentives Program (IMIP) extends beyond basic cost analysis. In addition, the effect of the IMIP upon the crucial components of the acquisition process such as free and open competition, degree of benefit to both prime and subcontractor levels, and defense industrial "surge" and "mobilization" capabilities must also be considered when determining the overall success of the IMIP in meeting its objectives [Cooper and Houck, 1985:4].

This inability to develop a comprehensive evaluation system was identified in three General Accounting Office reports in 1979, 1983, and 1984 (Spenny, 1986:3-4). These reports emphasized the need to establish more hard criteria for evaluating the need for or success of a particular IMIP project. In response to this deficiency, Cooper and Houck and Spenny in a follow-on study attempted to determine and

apply specific program criteria to evaluate the success of a particular IMIP project. Their research revealed nine critical success criteria such as reduced cost, improved productivity, improved item quality, degree of technology transfer, critical materials usage, etc. (Cooper and Houck, 1985:105). However, these criteria for the most part were either extremely difficult to quantitatively evaluate or rather subjective in nature. Although this study did reveal many other additional considerations which should be taken into account when evaluating an IMIP project, there was still no comprehensive, quantitative method for evaluating the success or failure of a particular IMIP project or the program as a whole. Since a purely objective method appears to be nearly impossible to develop, a subjective assessment method seems to be the most logical approach to evaluate the IMIP.

Research Objective

The objective of this research is to determine if the IMIP is having a significant effect on the improvement of the manufacturing capabilities of the U.S. defense industrial base. Since it is apparent that a comprehensive, quantitative approach is extremely difficult in this situation, an overall assessment of this critical program will be made based on the subjective evaluations of key IMIP program managers in both DOD and the defense industry. This research will be an exploratory study to provide additional

information about this controversial topic. Though this effort will not reveal hard data to prove the success or failure of the IMIP program, it is designed to provide a solid overall assessment of the effectiveness of the IMIP program based on the input of the Air Force and industry experts actually working these projects. In addition, through this research recommendations for program improvement will be revealed and areas for further study will be addressed.

Investigative Questions

The following investigative questions have been developed to guide this research on the overall effectiveness of the IMIP on improving the U.S. defense industrial base:

1. Is the IMIP effective in reducing program acquisition costs?
2. Is the IMIP effective in strengthening the ailing defense industrial base?
3. Do Government acquisition policies and regulations restrict the ability of defense contractors to profitably upgrade their manufacturing capabilities?
4. Are defense contractors delaying modernization efforts in order to obtain IMIP funding?
5. Are there any recommendations for the improvement of the IMIP?

Definitions

(The following definitions are taken from the Glossary of Acquisition Management Acronyms and Terms and the 1986 Production Base Analysis.)

Acquisition - The process for obtaining systems, equipment or modifications to existing inventory items.

Effectiveness - The extent to which the goals of the system (program) are attained, or the degree to which a system (program) can be expected to achieve a specific set of mission requirements.

Industrial Base - The capability of industry to respond to the needs of and produce items for DOD or other buyers.

Mobilization - Involves the significant expansion of the defense industrial base through a combination of expanding existing producers and converting nondefense producers.

Extensive disruption of peacetime activities may be required.

Productivity - The actual rate of output or production per unit of time worked.

Surge - Involves rapid increases in production relying on existing capability and may involve one or more critical defense items. Surge assumes maintenance of peacetime economic activities: no declaration of national emergency, and no disruption of the civilian economic activity.

Summary

The declining U.S. defense industrial base and its effect on the national security has been well-documented in the last ten years. The U.S. defense industry has been reluctant to invest their corporate profits to replace aging capital equipment. With the initiation of the IMIP, the Government and the defense industry have entered into a unique relationship to foster the revitalization of the ailing defense industrial base. Though IMIP proponents cite examples of successful programs, there are many critics who question the purported results. This criticism is largely based on the fact there is no comprehensive evaluation method.

Unfortunately, such an evaluation remains beyond the scope of the current research. However, a significant contribution of knowledge in this area can be made by determining the overall impact of the IMIP on the defense industrial base. This will be attained by interviewing selected key IMIP personnel in the field and analyzing their inputs.

Chapter II, Literature Review, will provide a foundation for understanding the industrial base problem, a historical review of the causes of the problem, and the efforts undertaken to correct the crisis. In addition, Chapter II will take an in-depth look at the IMIP process and procedures. Chapter III, Research Methodology, explains

the techniques used to determine the sample and population for this research. Chapter IV, Analysis of Findings, documents and analyzes the responses of the interview participants with regard to the effectiveness of the IMIP. Finally, Chapter V, Conclusions and Recommendations, summarizes the findings of the research and gives an overall assessment of the effectiveness of the IMIP. In addition, areas for further improvement will be addressed and recommendations for further research will be made.

II. Literature Review

U.S. Industrial Productivity Decline

The reasons for the recent decline in U.S. productivity growth include increased governmental policies and regulations, decreased capital investment, decreased research and development expenditures, and increased foreign competition (Magaziner and Reich, 1982:41-54). Though these factors all have an effect on productivity, it appears that these are not the primary causes of the recent, serious decline. Reich, in his book, The Next American Frontier, cites "paper entrepreneurialism" as the key reason for this decline. Reich states:

Managers have indeed adapted by innovating. But the innovations have not been technological or institutional. Rather, they have been based on accounting, tax avoidance, financial management, mergers, acquisitions, and litigation. They have been innovations on paper. Gradually, over the past fifteen years, America's professional managers have become paper entrepreneurs [Reich, 1983:140-141].

Indeed, America's capitalistic thirst for immediate profits have, in many cases, caused corporate managers to keep their eye on the "bottom line" and disregard the future.

Another perspective on America's recent productivity decline is provided by Elwood S. Buffa. According to Buffa, the U.S. has lost its competitive advantage for two primary reasons. First, a poor and uncoordinated manufacturing strategy that has caused a poor match between manufacturing capability and market demand. Secondly, noncompetitive and

inefficient manufacturing techniques have greatly increased unit costs (Buffa, 1984:13).

All these factors separately or in combination have lead to a significant decline in our industrial base and an increased reliance on foreign manufacturing. This dramatic decrease in the strength of the U.S. commercial industrial base has translated into serious decline in its defense industrial base.

U.S. Defense Industrial Base

Adequate preparation for war has never yet in history been made after the beginning of hostilities without unnecessary slaughter, unjustifiable expense, and national peril. It is only in the years of peace that a nation can be made ready to fight (U.S. Congress, 1980:7).

Historical Perspective. Many experts agree that the primary reason for the victory in World War II was the industrial might of the United States (Spenny, 1986:11). The "arsenal of democracy" pumped out 310,000 aircraft, 88,000 tanks, 10 battleships, 358 destroyers, 211 submarines, 27 aircraft carriers, and over 900,000 trucks and motorized weapons carriers (U.S. Congress, 1980:8). These impressive figures were the result of lessons learned during World War I. Prior to World War I the U.S. was totally unprepared for war. This fact is graphically portrayed in the following statistics. Of the 4,400 artillery pieces, 6,000 planes and 290 tanks employed by the American Expeditionary Forces only 500 artillery pieces,

1,200 planes, and 40 tanks were produced by U.S. production lines (Nickolas, 1983:320). In response to this severe problem Congress passed the National Defense Act of 1920. This Act established an industrial planning function within the Office of the Assistant Secretary of War (U.S. Congress, 1980:7).

Despite the lessons learned in World War I and the industrial planning that took place prior to World War II, the U.S. was still largely unprepared for initial surge requirements of the war. It was not until late 1943 that the U.S. could support the major land war in Europe. Even at this point the war in the South Pacific had to be fought on a very limited scale, so as not to tax existing war-time production capacities (Nickolas, 1987:9).

The tremendous buildup from World War II left the defense industrial base in good condition for the Korean Conflict. As a result, the U.S. was able to meet its requirements with little impact on the consumer (Spenny, 1986:12). The defense industrial base was able to gear up in a period of only four months (Cooper and Houck, 1985:15). In Vietnam, since the U.S. generally set the pace of the buildup, the U.S. policy during this period was called the "guns and butter" approach. As a result of this policy, the surge or mobilization production capabilities of the defense industry remained largely untested during this period (Baumbusch, et al, 1978:2).

It was during the post-Vietnam era that the capability of the U.S. defense industrial base to meet surge or mobilization requirements became more obvious. This concern was highlighted in a report by the Defense Science Board Task Force on Industrial Readiness in 1976. The Task Force concluded:

. . . the United States is presently deficient in the extent to which the defense industrial base is postured to provide materiel support to the forces in response to the full spectrum of potential conflict situations upon which our national security plans are based [U.S. Congress, 1980:9].

As a result of this finding, the DOD instituted a major mobilization exercise named Nifty Nugget in 1978. This exercise revealed the defense industry's inability to mobilize during a national emergency (Jori, 1986:1).

Nifty Nugget, other mobilization exercises, and increased Congressional interest led to the convening of a Congressional panel, which chronicled the plight of the U.S. defense industrial base in the "Ichord Report"--The Ailing Defense Industrial Base: Unready for Crisis. The report was the result of an in-depth study by the Defense Industrial Base Panel chaired by Representative Richard H. Ichord (Cooper and Houck, 1985:19). This historic report detailed the deplorable state of the defense industrial base. The panel reported several significant factors which caused the deterioration of the U.S. defense industrial base.

Causes of Defense Industrial Base Decline. The Ichord Panel reported six major findings which detailed the following causes of the declining U.S. industrial base:

--the defense industrial base has deteriorated and is in is in danger of further deterioration;

--the DOD has neither an on-going program or a plan to address this issue; DOD inaction, program

--instability, weapon system stretchouts, inadequate budgeting, and inflation have led to this condition;

--shortage of critical materials and dependence on foreign sources jeopardize the foundation of our defense capabilities;

--present procurement policies and procedures by the DOD are excessively inflexible;

--current tax and profit policies appear to discourage capital investment which would improve the defense industrial base;

--no single point of responsibility for the condition of the defense industrial base, which has led to a serious lack of long term planning (U.S. Congress, 1980:1).

This report compiled the major factors that had been impairing the ability of the DOD and the defense industry to maintain a healthy industrial base.

Many of these same findings are echoed by defense industry analysts and experts. Program instability seems to be a key factor in increased program costs. Dr. Jacques Gansler points out that the stretchout of the F-15 program in the mid-1970's resulted in a \$2 billion increase in program costs, which was the equivalent of eighty-three more F-15 aircraft (Gansler, 1987:162). Not only does program instability cause substantially increased costs, but it also

affects the size and relative strength of the industrial base. Studies indicate that the majority of firms contracting with the DOD prefer the stability of the commercial sector (Spenny, 1986:13). This preference has led to contractors to invest in their commercial business much more heavily than in their defense business.

Another factor which was highlighted in the Ichord Report was the DOD profit policy. According to this policy, a contractor is rewarded for a percentage of costs incurred under the contract. A contractor who cuts costs through some productivity enhancement will subsequently lose on future contracts, since his profit margin will be based on the lower costs (Gottschalk and McClenon, 1986:1-1). In addition to the DOD's questionable profit policy, industry's emphasis on short term profits as opposed to long term growth have significantly hampered defense industrial base growth (Correll, 1987:6).

Probably the area that the DOD has been hit the hardest on is strategic industrial preparedness planning. One critic contends the primary shortcoming of current DOD industrial base policy is that there is no long range planning function that links manufacturing resources, technology development, and force planning objectives to yield the greatest benefit to military war-fighting capabilities (Collins, 1983:302). This dangerous lack of industrial base planning was highlighted in the Ichord

Report. According to Representative Richard Ichord:

. . . one of the things that troubles me the most about the situation is the apparent lack of a long range strategic plan for industrial preparedness at the Department of Defense. We have received testimony that the Consolidated Guidance--the planning document used by the Department of Defense to establish its force structure--does not even address industrial preparedness. Instead, the Consolidated Guidance sizes our defense production base on the assumption that all future wars will be "short wars." That is, these wars will have to be fought with the equipment that is on hand when the war starts because it is assumed that the time to activate the production base would exceed the term of the "short war." That seems to me to be a self-fulfilling prophecy. If we plan for a "short war" and make no plans for a "long war", then surely all future wars will be "short wars" [Congress, 1980:20].

Essentially, according to Ichord, the DOD modified its battle plan to accomodate the declining industrial base rather than confront the issues and develop a plan to correct the problem.

It is apparent from the findings of the Ichord Panel and other industry experts that something had to be done to stem the tide of defense industrial base deterioration. The DOD implemented many of the required Ichord Panel recommendations. In addition, the DOD instituted many of its own initiatives. One such initiative was the Industrial Modernization Incentives Program (IMIP).

Industrial Modernization Incentives Program (IMIP)

Background. Recognizing the need to encourage defense contractors to modernize their aging factories, the Air Force implemented a program called Technology Modernization

(TECHMOD) in the late 1970's. The Army also had a similar effort called Industrial Productivity Initiatives (IPI). These programs became the basis for the IMIP (PBA, 1986:1). Acquisition managers theorized that these programs could reduce weapon system costs, while at the same time strengthen the surge/mobilization capabilities of the defense industrial base.

As a result of the "Ichord Report" and other Congressional and media pressures, in the spring of 1981 the DOD, under the Deputy Secretary of Defense, Mr. Frank Carlucci, conducted an intensive study to improve the overall acquisition process. This study resulted in thirty-two initiatives collectively known as the DOD Acquisition Improvement Plan (AIP) or the Carlucci Initiatives (Cooper and Houck, 1985:38-39). Initiative 5 entitled "Encourage Capital Investment to Increase Productivity" of the AIP identified the IMIP as a method to increase productivity through capital investment (Cooper and Houck, 1985:39). In 1982, under the direction of the Office of the Undersecretary of Defense for Research and Engineering a test program designated the Industrial Modernization Incentives Program was initiated on a test basis. This test program was basically the consolidation of the already existing TECHMOD and IPI programs. The test period was to last until 1985, at which time an overall assessment of the program would be made (AFSC Review, 1986:1).

Objectives. Upon completion of the test period, the program was approved and DOD Directive 5000.44 Industrial Modernization Incentives Program dated 16 April 1986 and DOD Guide 5000.44-G Industrial Modernization Incentives Program dated August 1986 were issued (IMIP Directive, 1986:1). This directive and its associated guide stated the policy and delineated the required procedures to implement an IMIP project.

According to the 1986 Air Force Systems Command Industrial Modernization Incentives Program Technical Review, the IMIP is defined as "a joint venture between the Government and industry to accelerate the implementation of modern equipment and management techniques in the industrial base" (AFSC Review, 1986:1). This report also detailed the long and short term objectives of the IMIP. The short term objectives are to reduce defense costs and production lead times and to increase the quality of manufacturing through productivity gains. The long term objective is to foster a strong industrial base for surge and mobilization requirements should a conflict or war arise (AFSC Review, 1986:1).

IMIP Procedures. Under the IMIP, incentives can be provided to encourage the contractor to invest its own funds to reduce acquisition costs. These IMIP projects are only approved when the DOD can see some tangible benefit such as reduced acquisition costs or improved production quality.

The two primary methods of contractor incentives are the Productivity Savings Reward (PSR) and contractor investment protection. PSRs provide additional financial incentive to the contractor in the form of a share of the savings that result from a productivity-enhancing investment. The contractor investment protection involves the Government assuming part of the investment risk in case of a program cancellation (IMIP Guide, 1986:1-3).

An IMIP project is conducted in three phases after preliminary discussions between the Government and the contractor reveal potential benefits to both parties and a memorandum of understanding is signed (See Figure 1).

In Phase I, a top-down, structured factory analysis is performed by the contractor. This detailed analysis results in a comprehensive strategic plan and a conceptual design of the prospective project. It is also during this period that the business arrangement is negotiated between the Government and the defense contractor. The business arrangement sets the ground rules for the subsequent program phases and establishes the PSRs for the contractor. An important point about this arrangement, that should be emphasized, is that it is actually a partnership between the Government and the defense contractor with each side sharing equally in the both the risks and rewards (PBA, 1986:B-4). An example of a draft IMIP business agreement is provided in Appendix B.

In Phase II, the detailed design, development, and validation of the prospective manufacturing system takes place. In addition, during this phase the plans for the purchase and installation of the validated projects are made. During the first two phases a majority of the funding is provided by the Government.

In Phase III, the investment and implementation of the proposed modernization projects actually occur. It is during this phase of the program that savings to the Government and PSRs to the contractor actually start accruing (IMIP Guide, 1986:1-8). It should be noted that if no savings occur, the contractor receives nothing.

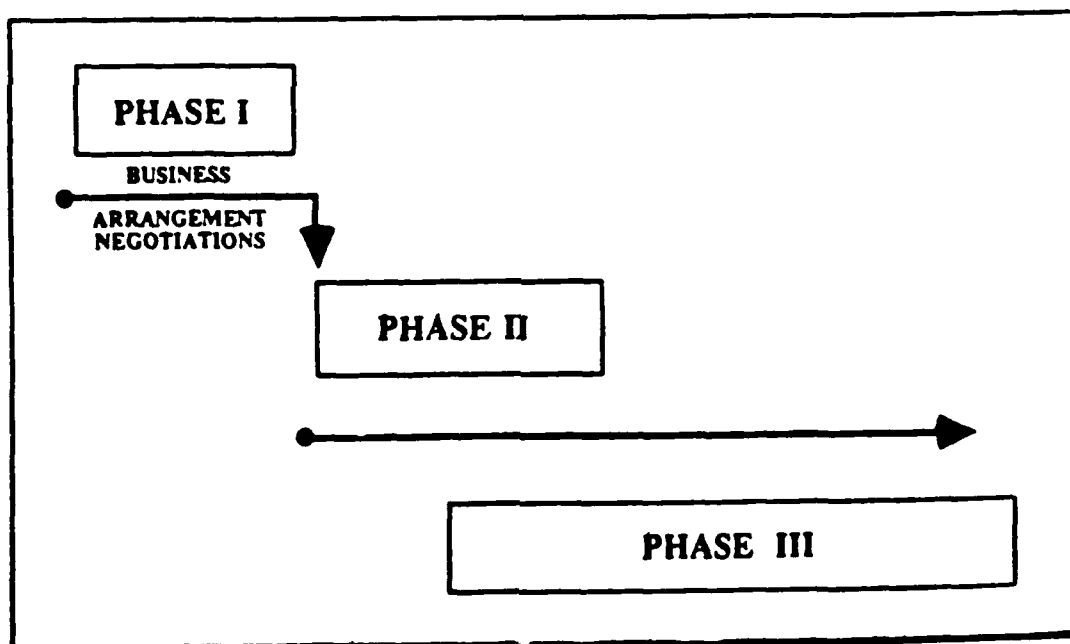


Figure 1. IMIP Phases (PBA, 1980:B-2).

Direct Government funding for IMIP projects may be provided from the acquisition programs involved or from the appropriate categories of Program Element (PE) 78011

"Industrial Preparedness". PE 78011 funds can only be used for Phases I and II of the IMIP project. At no time can these funds be used for the actual investment in capital equipment or facilities (IMIP Guide, 1986:1-9). Normally, the Government provides the funding for the analysis and preparation in the first two phases and the contractor is responsible for the actual investment in the capital equipment.

According to the 1986 Production Base Analysis published by the Aerospace Industrial Modernization Office, to date the average ratio of contractor-to-Government investment dollars has been four to one (See Figure 2). In other words, for every dollar that the Government invests, the contractor will invest four dollars (PBA, 1986:B-4).

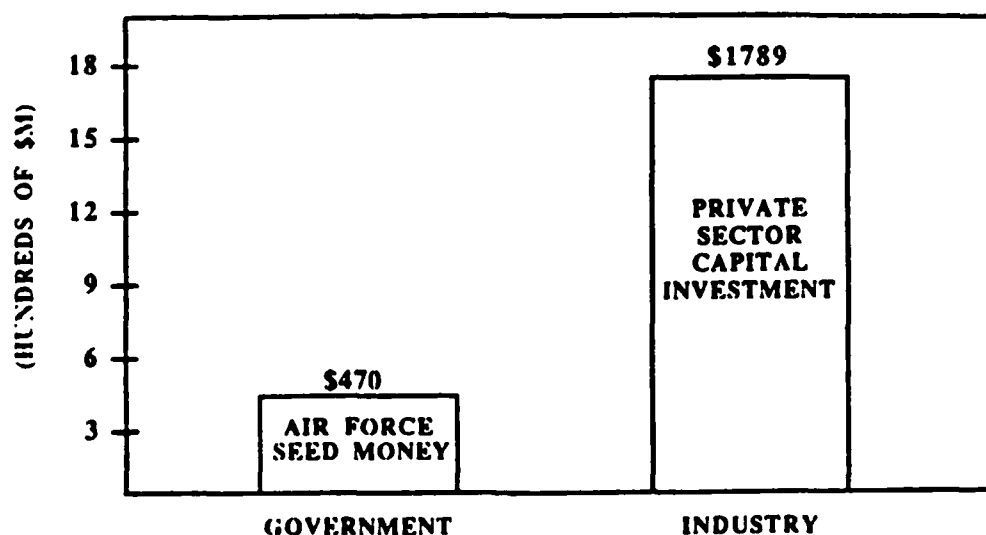


Figure 2. IMIP Funding Leverage FY 81 To FY 87 (PBA, 1986:B-4)

IMIP versus MANTECH. Another program with which the IMIP is sometimes confused is called the Manufacturing Technology program or as it is commonly called MANTECH (Not to be confused with TECHMOD). Though this program has the same goals of reducing weapon system costs and improving productivity, it has an entirely different focus from the IMIP. Where the IMIP is designed to put state-of-the-art manufacturing processes and equipment in our nation's industrial plants, MANTECH's objective is to advance the manufacturing state-of-the-art (Spenny, 1985:19).

MANTECH is centrally managed by the Materials Laboratory of the Aeronautical Systems Division. The program was initiated in 1948, when Air Force leaders recognized the need to improve manufacturing technology (Canan, 1986:74). Currently, there are over \$70 million worth of development contracts in the MANTECH program. Some of the more recent areas under research are production and integration of composites, powder metallurgy technology, electronics packaging, and conservation of critical materials. These and other technologies are developed and matured through the MANTECH program, then implemented through the IMIP (Canan, 1986:82). MANTECH is then the developer of these enabling technologies, while the IMIP is the conduit which accelerates the implementation of these matured technologies. Though MANTECH and the IMIP have different goals, they were meant to work in tandem.

Successful IMIP Projects. Air Force IMIP projects have received quite a bit of attention over the past several years. Examples of Air Force and defense industry contractors working together to improve productivity and reduce acquisition costs are predominant. Currently, the Air Force is projecting a cumulative cost savings of approximately \$7 billion as a result of on-going IMIP efforts (PBA, 1986:B-5). (See Figure 3) In addition, the Air Force can document actual contractor investment of almost \$1.8 billion through fiscal year (FY) 1987 as compared to the Air Force investment of \$470 million (PBA, 1986:B-3). These impressive figures would seem to indicate that Air Force IMIP efforts are paying big dividends.

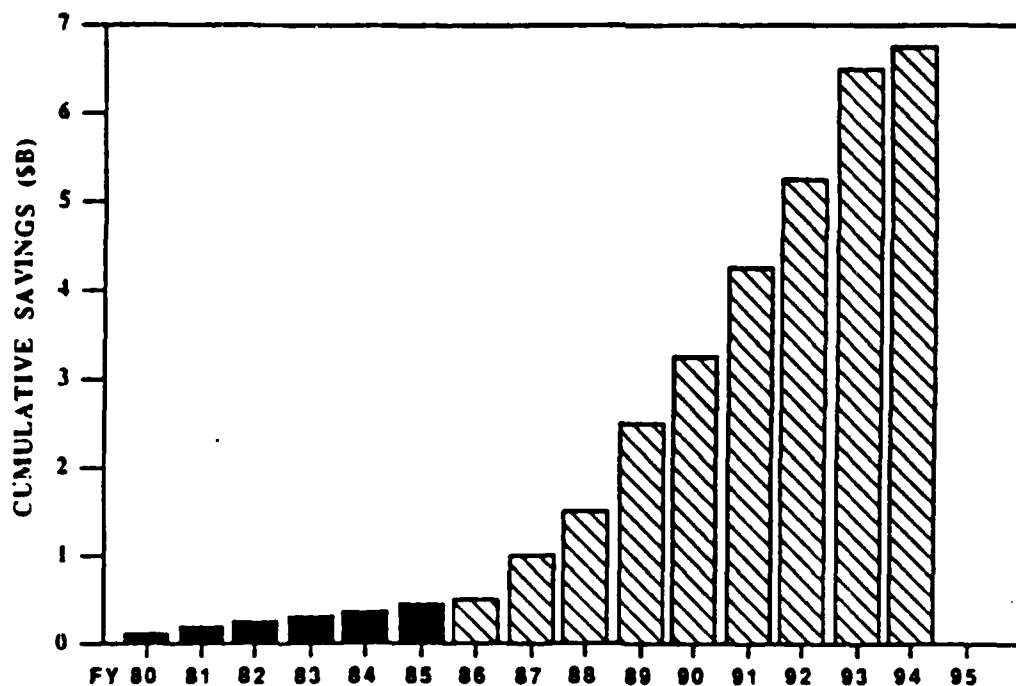


Figure 3. Cumulative IMIP Savings Projected and Negotiated (PBA, 1986:B-3)

A well-documented example of an Air Force IMIP project is the Westinghouse Defense Electronics Center in Baltimore, Maryland. This particular plant built electronic circuit boards for various defense applications. Prior to the IMIP project, 70% of all the boards failed inspection. The result was significant rework costs of the defective boards and extended production lead times. In 1983, aided by Air Force "seed money" from the IMIP, the contractor built a brand new state of the art facility in College Station, Texas. By 1987, Westinghouse had reduced expenses \$95.5 million. Over 85% of the circuit boards were passing inspection. Also, lead times were reduced from 12 to 3 weeks. The Air Force will accrue an estimated program savings of \$200 million by 1992 (Mitchell and Carrington, 1987:1).

Another example of a successful Air Force IMIP project is the "Propulsion TECHMOD" program initiated in 1982. Realizing the significant impact that subcontractors have on overall program costs and lead times, the Deputy for Propulsion at the Aeronautical Systems Division (ASD) of AFSC negotiated agreements with General Electric, Pratt & Whitney, Williams International, Teledyne and Garrett, with the intent of flowing the Air Force funding down to key subcontractors to alleviate critical bottlenecks, improve quality and reduce overall program costs. General Electric has already returned almost \$5 million from production of

the F101 engines for the B1-B bombers. As of October 1986, the General Electric TECHMOD program has cost the Air Force approximately \$53 million and General Electric and its subcontractors expect to invest over \$300 million. The Air Force estimates this will translate to savings of \$400 million dollars in the long run (Canan, 1986:77). In all, the Air Force has invested over \$132 million in the "Propulsion TECHMOD" program. By 1992 the Air Force expects to save over \$750 million (Canan, 1986:77).

Probably the best known and largest DOD IMIP project is the agreement with General Dynamics Corp, Fort Worth Division. This program, entitled the F-16 Industrial Technology Modernization (ITM) Program, has over 30 subcontractors participating. The ITM program, which was initiated in 1980, has already documented savings of over \$245 million (PBA, 1986:B-8). These savings are based on an Air Force investment of \$25 million (Canan, 1986:78). By 1993 the program is expected to involve close to 90 subcontractors with an estimated capital investment of \$400 million. The projected DOD savings from this important effort are expected to exceed \$2 billion dollars by 1993. The projected savings of the ITM program are the equivalent of 180 additional F-16 fighter aircraft. This savings equates to a return on investment ratio of greater than ten to one for the DOD (PBA, 1986:B-8).

Currently, there are well over 100 contractors and subcontractors involved in the above-mentioned and other IMIP projects in the Air Force alone. By 1994 the expected DOD savings are projected to exceed \$7 billion dollars (PBA, 1986:B-5). Examples similar to the ones given above are numerous. Given all these glowing reports of purported successful IMIP projects, one would think that the IMIP has had an important impact on the defense industrial base. However, it still has not won the support of all factions of the Government and industry.

IMIP Criticisms. Many proponents of the program, as well as critics, contend that the program is of limited effectiveness. According to one IMIP consultant, contractors will only invest their corporate funds when it is profitable for them to do so (Mitchell and Carrington, 1987:1). In other words, when the "bottom line" dictates that the time is right, then and only then will the defense contractors make significant capital investments. Another aspect of this limited effectiveness problem is the sheer enormity of the subcontractor problem. Subcontract costs account for close to half of the total contract expenses (Canan, 1986:77). Currently, the Air Force is dealing with slightly over 100 prime and subcontractors through its IMIP efforts. It is estimated that there are over ten thousand subcontractors that are involved in defense work (Mitchell and Carrington, 1987:1). This would seem to indicate that

the IMIP is far from solving the deterioration of the U.S. defense industrial base problem.

Another criticism of the IMIP is that the Government is doing the contractor's job. It should be the contractor's responsibility to maintain and upgrade his facilities to keep up with advancements in manufacturing technologies and the competition in the "world marketplace". As one executive from Raytheon Corporation indicated, the Government is providing the contractors with funding to do the kinds of projects they would eventually do themselves (Mitchell and Carrington, 1987:1). Congress appropriated \$259 million for FY 1988, which was \$100 million more than DOD requested. However, it seems logical to assume this support could come to an abrupt halt if Congress perceived IMIP as a handout to defense contractors, who would make the required investments anyway (Mitchell and Carrington, 1986:1).

The most serious criticism of the IMIP is the lack of a comprehensive evaluation process to determine its overall effectiveness. Advocates of the IMIP point to the enormous projected savings; however, a 1985 GAO study concluded that the actual program savings were significantly lower than the projected savings (Nickolas, 1983:27). In some cases the modernization efforts did not work at all. In addition, in many cases simple program cost reductions may not be the key benefit of the IMIP project. In their thesis, Measuring the

Effectiveness of the Industrial Modernization Incentives

Program, Cooper and Houck point out that other criteria, such as surge or mobilization improvements, may also be as important as cost reductions to determine a successful IMIP project (Cooper and Houck, 1986:4). Yet, these more subjective indicators are extremely difficult to measure. The question of how to properly assess the impact of an IMIP project still remains one of the most significant IMIP problems.

III. Methodology

Introduction

The reluctance of the defense industry to modernize its manufacturing capabilities has caused a serious degradation of the defense industrial base. In an effort to revitalize the declining industrial base the DOD initiated the Industrial Modernization Incentives Program (IMIP). This program was designed to encourage defense contractors to modernize their facilities and equipment in return for additional contract incentives. The short term goal of this program is to reduce acquisition costs and lead times and improve quality levels through productivity gains. In addition, the long term goal of this program is to strengthen the defense industrial base to support surge and mobilization requirements.

Though the IMIP and its predecessor TECHMOD have been in existence since the late 1970's, a comprehensive evaluation methodology has not yet been developed. There have been several efforts to develop a comprehensive approach; however, they have all fallen short in constructing this necessary evaluation method. The major problem is that there are several subjective criteria that must be evaluated to determine the success of a program. This subjectivity has made it difficult to provide an assessment of an IMIP project. In some cases, improvement in a criterion may cause a degradation in another criterion.

This difficulty has lead to constant debate over the effectiveness of the IMIP. This research, however, is designed to quell this on-going debate. The goal of this research is explore the perceptions of the "experts in the field" to determine the effectiveness of the IMIP and possible improvements to this program. Through a series of personal and telephone interviews with selected "experts", a comprehensive picture of the status of this program will be drawn. In addition, any problems that are inhibiting the effectiveness of the IMIP will also be addressed. Figure 4 depicts the general research methodolgy to be used in this research project.

Methodology Justification

The selection of personal and telephone interviews over the mail questionnaire as the primary data collection technique has significant effect on the quality of response. According to Don A. Dillman in his book Mail and Telephone Surveys,

The absence of an interviewer puts the mail questionnaire at a distinct disadvantage. Not only do some people find it more difficult to express themselves in writing than orally, but the absence of the interviewer's probes frequently results in answers that cannot be interpreted and sometimes no answer at all. The difficulty of the open-ended questions and the near impossibility of solving it represents one of the most severe shortcomings of mail questionnaires [Dillman, 1978:58].

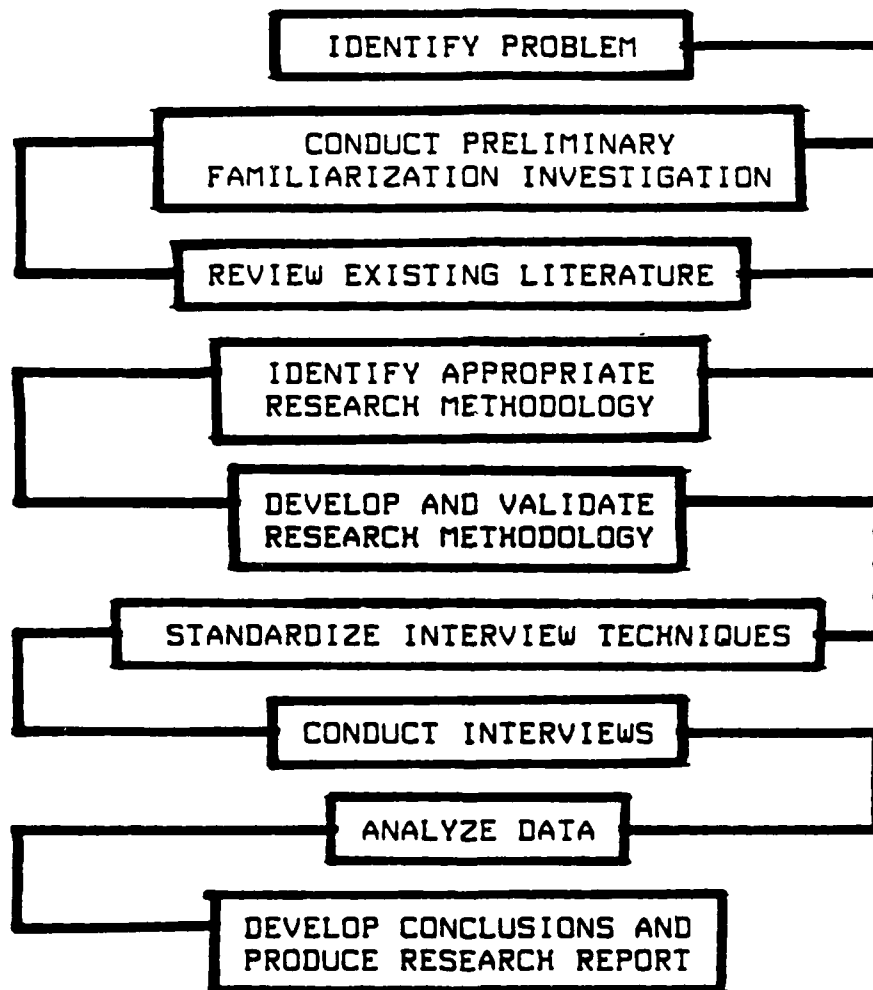


Figure 4. General Research Methodology

Adapted from Measuring the Effectiveness of the Industrial Modernization Incentives Program (IMIP) by Capt Stephen R. Cooper and Charles E. Houck--AFIT/GLM/LSP/85S-36, Air University, September 1985.

In order to get candid, in-depth responses from the respondents it is necessary to use open-ended questions. These circumstances indicate that telephone and personal interviews are the only viable ways to obtain the required data, given the time constraints involved.

The decision to use personal versus telephone interviews is largely an economic one. Due to limited travel funds and the considerable time involved in travel, only interviews in the Wright-Patterson AFB area will be conducted personally, while all others will be conducted telephonically. The impact of personal versus telephone interviews is nominal since the same interviewer will be asking the same questions to each subject and can therefore control any possible biases.

There are some inherent limitations in using telephonic interviews versus personal interviews. According to C. William Emory, in his book Business Research Methods, availability of the interviewee, limited length of the interview, and lack of visual aids will all affect the quality of the research data collected (Emory, 1980:171). Though these factors may have some impact on the quality of the telephone interviews, they should not have a significant overall effect on the data. Due to the busy schedules of the respondents, these same factors will be at work whether personal or telephone interviews are used. Since the same factors should be at work in either case, the proposed

biases induced by telephone interviews will be largely controlled. However, in order to assure that no biases negatively affect the data collected, all interviews will be completed in approximately thirty minutes and no visual aids will be used. In addition, to assure that no negative biases enter into the interview, a structured interview method will be used.

Interview Design

The interview questions were designed to accommodate both the personal and the telephone interview. Each question is structured to give the respondent ample opportunity to answer without the need for graphs or charts. In addition, the number and scope of the interview questions were designed to limit the interview to approximately thirty minutes. In this way the biases addressed previously will be minimized.

As stated earlier, the objective of this research is not to develop a comprehensive quantitative evaluation method, but rather to assess the impact of the IMIP on the defense industrial base. To accomplish this the experts will be asked their subjective opinions on various issues affecting the defense industrial base and the Industrial Modernization Incentives Program (IMIP). The questions are not designed to provide quantitative data. Instead the resulting data is qualitative. This qualitative data will then be compiled and reviewed to determine any similarities

or differences between Air Force and defense industry responses. The interview questions for this research are provided in Appendix A.

Respondent Selection

According to Benson and McClave, in their book Statistics for Business and Economics, a population is defined as "a set of data that characterizes some phenomenon", while a sample is defined as "a subset of data collected from the population" (Benson, McClave, 1985:5). In this case the population is all DOD and defense industry IMIP managers. Since it would be extremely difficult and time-consuming to interview each IMIP manager, a representative sample of Air Force IMIP managers in AFSC and their defense industry counterparts was selected.

Interview candidates were selected from the Air Force Systems Command Industrial Modernization Incentives Program Technical Review published by the Aerospace Industrial Modernization (AIM) Office, AFSC/PMI. Ten Air Force IMIP managers and their private-sector counterparts were chosen from among the IMIP projects throughout AFSC. Though Air Force Logistics Command (AFLC) has two programs, they were not included in the sample since they do not have a significant impact on the overall program.

Based on the information provided in the Technical Review, the prospective respondents were selected based on the size and relative importance of their respective IMIP

projects to the entire IMIP. In addition, the proposed list of respondents was reviewed by personnel in the Aerospace Industrial Modernization (AIM) office to ensure a representative sample was selected. After review by the AIM office, proposed respondents from Space Division and the Ballistic Missile Office were deleted from the list, since they currently do not have any active IMIP projects. The remaining respondents and additional respondents proposed by the AIM office are involved in the most significant and visible projects throughout the Air Force. It would be logical to assume that these particular IMIP managers would be the most experienced and knowledgeable about this complex program, and therefore, provide the best insight into the IMIP and its effects on the U.S. defense industrial base.

Interview Technique

Emory states, "What we do or say as interviewers can make or break a study" (Emory, 1980:162). An interviewer must develop a good rapport with the respondent to assure the information provided is meaningful and accurate. According to Emory, for this cooperative atmosphere to occur during the interview the respondent must:

- 1) feel that the experience will be pleasant and satisfying;
- 2) believe that the survey is important and worthwhile;
- 3) have any mental reservations satisfied (Emory, 1980:162).

In order to establish the necessary rapport with the prospective respondents for this research the following guidelines were instituted.

1. Each prospective respondent was contacted to determine their willingness and desire to participate in the interview on the IMIP.

2. The respondents were guaranteed anonymity and an explanation of the presentation of the data was provided to assure them of their anonymity.

3. A letter of introduction expressing the importance of this research with definitions and the structured interview guide were forwarded prior to the actual interview to ensure complete understanding of the procedures.

4. The respondents were provided an opportunity to add their additional, personal opinions and comments during the interview.

5. During all discussions the academic nature of this research was stressed to assure the respondents their complete anonymity in their responses to the interview questions.

Limitations

Since this research was designed to acquire the perceptions of the IMIP experts in the field, the data compiled is subjective in nature. Since the information provided by this research is largely subjective in nature,

provided by practicing experts on the subject, and the sample size was so small, a traditional "validation" of the data was not attempted. The fact that responses ultimately tended to be uniform across the sample is, in itself, a validation. In addition, since this research was not designed to deliver "hard" data, any form of quantitative analysis would be of limited value. Despite these limitations, the perceptions and opinions of these selected experts should provide valuable insights into this important program.

Another limitation which may affect the research is some of the questions will require the defense industry IMIP managers to provide answers which might be considered not to be in their best interests. For instance, when asked if the respondent felt that his firm was delaying modernization projects in hopes of obtaining IMIP funding, the respondent might be tempted to answer negatively, even though this may be actually the case. The only way to overcome this temptation is to stress the academic nature of this research and the accompanying anonymity.

IV. Findings and Analysis

Introduction

A total of nineteen interviews were conducted during the period from 18 Jul 1988 to 1 Aug 1988. Ten Air Force IMIP managers and nine industry managers representing the most significant Air Force IMIP efforts were interviewed. Due to scheduling conflicts the tenth industry manager could not be interviewed. All respondents were extremely helpful and enthusiastic about the research. The interview durations for both telephonic and personal interviews ranged from approximately 30 minutes to 50 minutes. Since both types of interviews ran for approximately the same duration bias between personal and telephonic interviews was reduced.

The analysis of the fifteen interview questions is provided in this chapter. The interview questions are located in Appendix A. Additional comments and suggestions provided by the respondents are also summarized in this chapter.

Interview Question #1

What is the current status of your program (i.e. phase, cost, funding ratio)?

This question was asked strictly to determine the maturity of the programs with which each manager was involved. In all cases, both Air Force and industry managers were at least at the end of Phase II. This information provided the researcher with a gauge to measure

the experience of the individual respondents. All Air Force and industry respondents were very experienced and knowledgeable about their specific project and the IMIP as a whole.

Interview Question #2

Has IMIP reduced program acquisition costs?

One hundred percent of both Air Force and industry indicated that they felt that the IMIP did reduce program acquisition costs. Many of the managers had documented actual savings to prove their belief. Those who did not have actual savings figures believed their program projections were quite achievable.

Most felt that this was a valid criterion for determining the success of a project; however, some still expressed reservations that due to the increased emphasis on this aspect the goal of industrial modernization seemed to be taking a back seat to return on investment (ROI).

Interview Question #3

Has IMIP increased or decreased program productivity?

Once again, all respondents both in the Air Force and industry agreed that the IMIP increased program productivity on their specific programs. Though some respondents did know of programs where a specific project failed to increase productivity, they felt that occasionally due to the human aspect of program management some mistakes would be made. However, if a proper factory and cost analyses are

accomplished, these program productivity decreases would not occur. These productivity increases were due in large part to improvements in manufacturing processes and management information systems.

Interview Question #4

Has IMIP accelerated the development of state of the art technology through technology transfer?

All Air Force and industry managers agreed that the IMIP does accelerate manufacturing technology development through technology transfer. However, four of nine industry managers and five of ten Air Force managers indicated that this aspect of the program needs improvement.

It appeared that the quality of technology transfer varied from program to program. Some programs sponsored conferences and provided engineering support to other companies interested in the particular technology, while others conducted a project completion briefing and sent their final report to the Defense Technical Information Center (DTIC) per contract requirements.

It was also pointed out by several respondents both in the Air Force and industry that very little direct technology transfer actually takes place. Rather, technical information is simply disseminated in one form or another throughout the defense industry to all those interested in the particular technology. Although this may not be considered true technology transfer, many defense contractors felt this openness in sharing technology

innovations was having a positive catalytic effect on industry modernization efforts.

Interview Question #5

Has IMIP increased surge/mobilization capabilities?

One hundred percent of the industry IMIP managers agreed that the IMIP does increase surge and mobilization capabilities. Air Force managers, on the other hand, were split. Fifty percent said the IMIP increased surge and mobilization capabilities, while the other fifty percent said the IMIP did not.

Those who felt the IMIP did not improve surge and mobilization capabilities indicated that though the individual projects may increase productivity and therefore increase industrial capacity, the surge/mobilization problem is much more complex than strictly productivity issues. Also, due to the relatively limited scale of the IMIP, it does not have the significant positive impact to substantially affect the surge and mobilization capability of the U.S. defense industrial base.

Interview Question #6

Has IMIP reduced critical materials usage?

With regard to critical materials usage six of the Air Force managers said it did reduce critical materials usage, while one said it did not and three were unable to comment on this particular question. As for industry IMIP managers,

six believed it reduced critical materials usage, while two believed it did not and only one IMIP manager was unable to comment.

For those who concurred that the IMIP does reduce critical materials usage only one Air Force manager and his defense industry counterpart said that they had a specific project that were designed with the reduction of critical materials usage in mind. All others said the reduction was due to more efficient manufacturing processes, which reduced the scrap and rework rates. This decrease in these rates, in turn, generated a reduction in critical materials usage.

Interview Question #7

Do you feel that IMIP is restricting competition on DOD acquisitions?

Nine out of ten Air Force managers and all nine industry managers indicated that the IMIP is not restricting competition on DOD acquisitions. Conversely, all these managers felt that the IMIP was actually increasing the competitiveness of DOD acquisitions. Many pointed to examples of increased subcontractor competition for subsystems for major weapon systems due to IMIP-induced technology improvements.

The lone dissenting opinion on this issue felt that the IMIP can increase competition. However, due to the inconsistent manner in which system program offices (SPO)

advocate and administer the IMIP, some defense contractors are receiving an unfair competitive advantage over their competitors.

This opinion, though a minority one, was probably the first indication of some problems in the management of the overall IMIP, which were also evident in subsequent responses to other interview questions.

Interview Question #8

Do you think defense contractors are delaying modernization efforts in hopes of obtaining IMIP fundings?

All of the industry managers said that they were not delaying modernization efforts. Nine out of ten Air Force managers agreed. The other Air Force manager stated that it was hard to determine and he was not sure. Somewhat surprisingly, it appears that both sides agree that industry does not consider the IMIP a handout for use in place of their own capital.

Air Force managers pointed out that a prospective IMIP contractor will not receive any funds, unless he demonstrates he has an active strategic modernization plan of his own. Several industry managers noted that IMIP is a supplement which allows them to take on modernization programs that appeared to be too risky or did not generate a reasonable ROI.

Once again, both sides concurred that IMIP is a catalyst that enables defense contractors to modernize their

plants and equipment in the all too unstable world of defense systems acquisition. Another important point that was brought out was that IMIP funding allows contractors to modernize sooner than they would have otherwise planned. This results in savings to both the Air Force and the contractor sooner than originally planned.

Interview Question #9

Is IMIP an effectively managed program? Do you have any recommendations for program improvement?

Opinions on this particular issue were split on both sides. Five out of ten Air Force IMIP managers felt the program was not managed well. On the industry side, five out of nine IMIP managers also thought the program was not being managed effectively.

The main reason for this split seemed to be consistency or rather the lack of it. Industry particularly noted the fact that within the Air Force there are numerous business agreements. It was even pointed out that within product divisions IMIP procedures were handled differently from one program office to another. These program inconsistencies seemed to cause much additional labor and increase administrative lead times for contract award.

Another prevalent opinion among both industry and Air Force managers was the serious lack of high level advocacy in both industry and DOD. Several managers felt this lack of advocacy has made the IMIP the "poor stepchild". There

is a serious lack of funding and resources to effectively manage this important program.

There were several other opinions as to the causes that lead to the ineffective management of this program such as lack of direct engineering and contracting support, lack of funding, and no strategic planning. But all of these problems appear to be symptoms of inconsistent policy and procedures and lack of high-level advocacy.

There were many recommendations provided for program improvement. However, since many of these same recommendations were reiterated in response to interview question #15, they will be provided in the discussion for that question.

Interview Question #10

Should IMIP be expanded and funds increased? If not, why not?

The answer to this question was an overwhelming "yes". Both Air Force and industry IMIP managers were strongly in favor of increasing IMIP funding. Furthermore, virtually all respondents indicated that IMIP should be a direct line item in the budget, not a part of one as it is now. This would enable the Air Force to strategically plan future IMIP projects.

Many respondents felt the current funding method of begging the program offices for funding was very inefficient and seriously hampered the effectiveness of the program.

Also, when funding was not available from the program offices many beneficial projects were left on the shelf.

Interview Question #11

Do you think greater controls should be placed on defense contractors to account for IMIP funding?

Four of the Air Force managers felt greater controls were necessary, while the other six managers thought that greater controls would be counterproductive. Eight out of nine industry managers agreed that the present controls were more than adequate.

Several of the Air Force managers felt there were better and more efficient validation methodologies that would provide the required visibility, but would not require substantial additional effort on the part of the IMIP contractor. Industry managers, on the other hand, felt the current requirement were already too taxing. Some IMIP managers pointed out the negative effect it was having on their small subcontractors that really needed IMIP funding support.

Interview Question #12

Should defense contractors be required to shoulder more of the financial burden to revitalize the industrial base?

Nine out of ten Air Force managers and all nine of the industry managers felt that given the present situation in defense systems acquisition, industry was shouldering as much of the burden as it could afford. Many industry

managers referenced their already existing strategic modernization plans and the IMIP funding ratios as examples of how industry was actively involved in modernization. Air Force managers concurred that the defense industry was doing all it reasonably could be expected to do given the situation.

Interview Question #13

Given the restrictive nature of DOD acquisition policies and procedures, do you think it is possible for defense contractors to profitably upgrade their facilities without IMIP funding? Why or why not?

Seven out of ten Air Force managers and seven out of nine industry IMIP managers agreed that defense contractors could not profitably upgrade their facilities without IMIP support. The three Air Force managers and two industry managers felt it could be done. However, it would be somewhat risky and would be contingent upon the amount of commercial business that the individual defense contractor currently possesses.

Several industry and Air Force managers caveated their answers by saying that given the present situation it would be very difficult. But if the defense contractors were given more multi-year programs it would be feasible, since these programs would provide stability necessary to make the large capital investments required to remain competitive in U.S. and world markets. Without this stability and with the relatively low profit margins on defense contracts it is

doubtful that contractors could upgrade to the extent necessary without the support of the IMIP.

One might expect that IMIP managers would agree with this question, since it may be indicate that the IMIP is not necessary to improve the defense industrial base. However, throughout the interviews all respondents were extremely open and candid in their responses to all the interview questions. In addition, their responses to this question was consistent with their responses to related interview questions.

Interview Question #14

Is IMIP effective in strengthening the industrial base?

One hundred percent of both Air Force and industry IMIP managers concurred that the IMIP is effective in strengthening the U.S. defense industrial base. However, most of the managers caveated their statement by saying currently the program is of limited effectiveness due to the limited scope of the program. Once again, funding was considered the most significant reason for the limited effectiveness of this important program. Several respondents, both Air Force and industry, felt that the IMIP could have a significant impact on revitalizing the industrial base, if the program was provided the high level advocacy and funding necessary to properly execute the program.

Interview Question #15

Do you have any other comments or suggestions?

The general comments from both Air Force and industry personnel reflected overwhelming support for the IMIP. A majority of the respondents stated IMIP has great potential to significantly improve the defense industrial base. It was also stated by several managers that the IMIP is just one of the tools used to strengthen the industrial base. It should be used as part of an overall strategic industrial modernization plan. The IMIP is a means to an end, not an end in itself.

Additionally, the respondents provided several insightful suggestions designed to improve the effectiveness of the IMIP. The suggestions are as follows:

- Centralize DOD (or at least Air Force) policy and procedure functions to provide consistent IMIP guidance to all activities.
- Provide direct budget line item funding through the Program Objective Memorandum process and increase overall funding in order to expand program to meet future modernization requirements.
- Standardize and streamline as much as possible the administrative activities and procedures, such as business arrangements, costing methodologies, etc., to reduce unnecessary paperwork and shorten administrative lead times.

- Conduct IMIP strategic planning to efficiently and effectively allocate scarce resources.
- Develop high level advocacy to encourage the support of the IMIP.
- Provide dedicated contracting and engineering staff to support the IMIP.
- Conduct IMIP educational/public relations seminars to Air Force and industry organizations to increase understanding and support for the IMIP.

Summary

Overall, it appears that both Air Force and industry IMIP managers are in agreement on most of the issues surrounding the IMIP. There seems to be a substantial division of opinion within each group on the issues of technology transfer, effective IMIP management, and additional administrative controls. A summary of Air Force and industry responses is provided in figures 5 and 6, respectively on the following pages.

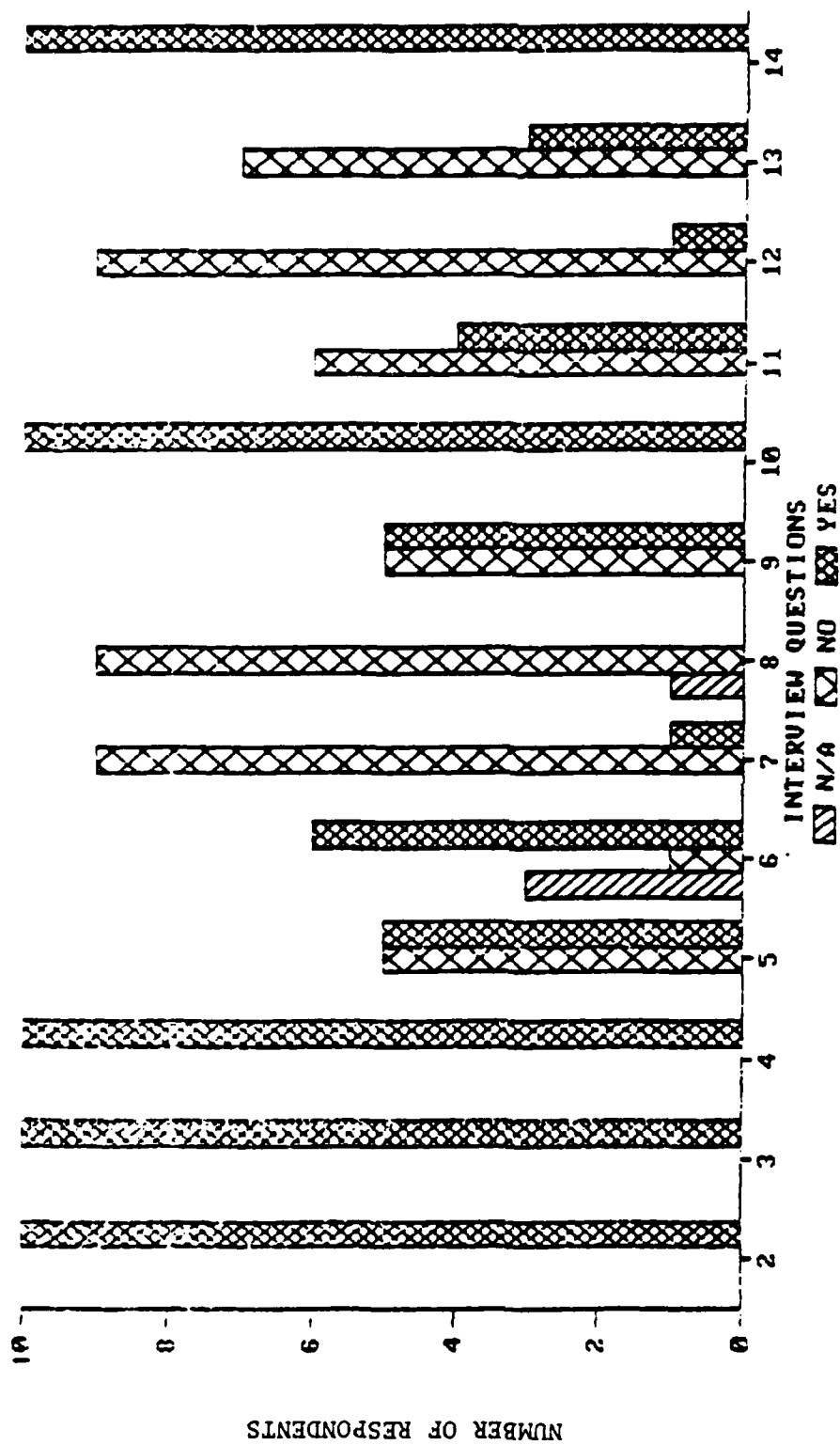


Figure 5. Summary of Air Force IMIP Manager Responses

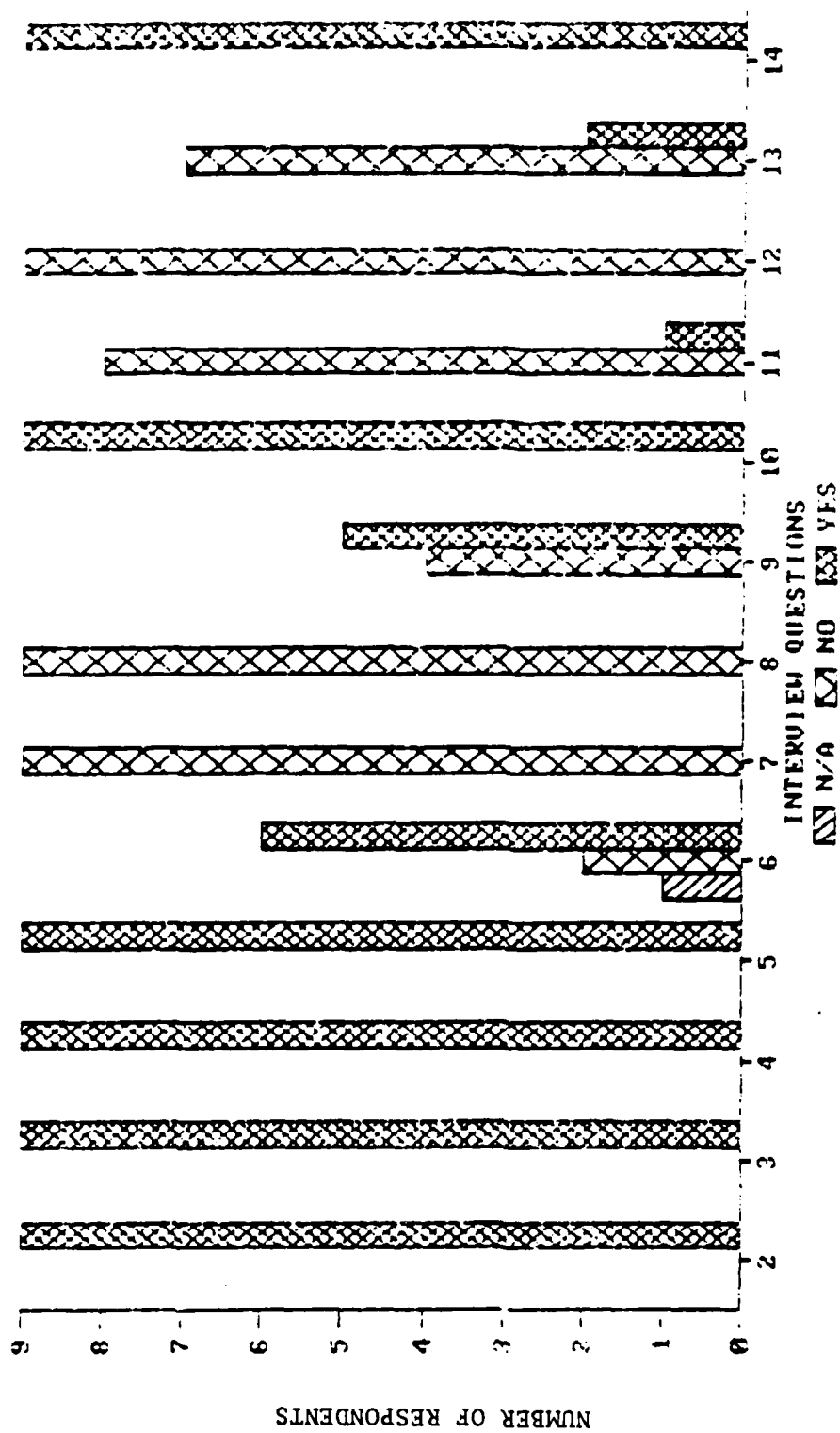


Figure 6. Summary of Industry IMIP Manager Responses

V. Conclusions and Recommendations

Introduction

The Industrial Modernization Incentives Program is the first significant attempt by the DOD to alleviate the declining industrial base problem. Since its inception, the IMIP has attracted many proponents; however, there are still many critics, who contend that the IMIP is an ineffective Government handout program.

This research was designed to quell some of that debate by going directly to the source -- the Air Force and industry IMIP managers in the field. By analyzing their responses to the interview questions an overall evaluation of the status of the IMIP and its effects on the defense industrial base can be made.

In this chapter, based on the respondents answers to the interview questions, conclusions to the investigative questions stated in Chapter I will be made. In addition, recommendations for areas of further research will also be addressed.

Investigative Question #1

Is the IMIP effective in reducing program acquisition costs?

The answer to this question is an unequivocal "yes". All respondents, both Air Force and industry, were very positive in their responses. Based on the actual and projected savings figures quoted by these experts, as well

as other documented information, it is readily apparent that the IMIP does reduce program acquisition costs. Several of the projects were projecting returns on investment of greater than four-to-one.

One of the main reasons for these significant cost savings appeared to be the productivity gains due to more efficient and cost-effective manufacturing processes. In addition, more effective management through the use of management information systems was also noted in this research.

The only real point of contention is the amount of actual savings. Many experts feel that costing methodologies and administrative procedures need to be improved, not necessarily increased, to provide more reliable savings figures. These more reliable savings figures could only help to improve the image of the IMIP in the eyes of its critics.

Investigative Question #2

Is the IMIP effective in strengthening the ailing U.S. defense industrial base?

The answer to this question is a caveated "yes". All respondents agreed that the IMIP did have a positive effect on the industrial base; however, the effects of the program were limited due to its scope and funding level. This strengthening of the industrial base has also to a limited degree, improved the surge and mobilization capabilities of

the defense industry. But once again, the restrictive funding levels of the IMIP have limited its positive effects.

The improvement in the industrial base and its attendant surge and mobilization capabilities is due, in part, to the productivity gains through more efficient manufacturing processes and management practices implemented by the IMIP.

Investigative Question #3

Do Government policies and procedures restrict the ability of defense contractors to profitably upgrade their manufacturing capabilities?

Once again, a majority of the respondents were in agreement that governmental policies and procedures did restrict contractors' ability to profitably upgrade facilities. Major weapon system program stretch-outs, increased emphasis on competitive procurements, the DOD profit policy, and lack of multi-year funded programs were cited as examples of DOD procedures which severely hampered defense contractors from making substantial capital investments. Industry managers pointed out that program stability was essential, if they were to make substantial capital investments in modernizing their facilities. They explained this stability was critical in enabling their companies to strategically plan future modernization efforts. These tremendous capitalization efforts must make financial sense to their corporate boards of directors. If

these companies cannot show a stable cash flow to finance this effort, then they always be disapproved, since they cannot guarantee an acceptable return on investment of corporate funds.

Investigative Question #4

Are defense contractors delaying modernization efforts in order to obtain IMIP funding?

Based on this research it appears that defense contractors are not delaying modernization efforts. Rather they are seeking out IMIP funding for those projects which have been determined to be too financially risky for the company to undertake without the financial support of the IMIP.

Surprisingly, Air Force managers agreed with their industry counterparts that industry was bearing its share of the financial burden to modernize their facilities. The industry to Government funding ratios indicate this fact rather clearly. It was pointed out on several occasions that one of the criteria for award of an IMIP contract to a worthy defense contractor was the company's strategic modernization plan. Defense contractors cannot receive IMIP funding without demonstrating their own initiative in modernizing their facilities.

The major defense contractors are not delaying modernization efforts and are carrying the share of the financial burden to modernize their facilities. As several

Air Force and industry managers stated, the IMIP is a complement to the contractor's modernization program not a replacement for it.

Investigative Question #5

Are there any recommendations for the improvement of the IMIP?

Research revealed several significant recommendations for the improvement of the IMIP. Though there were more recommendations than those listed below, the following represent the majority recommendations made by the respondents.

The most significant recommendation is the need for centralization of the policy and guidance of the program and standardization of procedures. Many of the respondents felt that this centralization/standardization was absolutely necessary given the limited program resources. They felt this centralization/standardization would streamline procedures which would result in a more efficient and effective program.

The next recommendation is to develop greater high-level advocacy for this critical program both in Government and industry. An extensive educational/public relations effort is critical to the achievement of the recommendation. Many respondents felt this high-level advocacy is necessary if the program is to be considered more than a "poor stepchild". This advocacy would also enable the IMIP

offices to receive the manpower necessary to properly manage the program. In addition, this high-level advocacy is quite necessary for achievement of the next recommendation -- direct budget line item funding.

The need for increased funding through a direct budget line item was reiterated time and again during the research. This direct funding would give the program the increased funding and stability necessary to conduct strategic modernization planning. In the past strategic planning was not feasible because a bulk of the program funding came from the individual program offices, which had to be "begged for" by the individual IMIP managers. This policy of chasing fallout money made it impossible to plan future requirements, since funding for these requirements were never programmed.

Recommendations for Further Research

Some recommendations for areas of further study are as follows:

- Conduct similar research involving high-level industry and DOD personnel to determine the amount of support of these important individuals.
- Conduct the same research using Navy or Army IMIP managers and their defense industry counterparts to evaluate the status of their programs.
- Conduct research to determine the feasibility of establishing a Government office or agency to manage all

industrial base concerns.

-- Conduct a study to determine the effects of establishing centralized IMIP contracting office within each of the major product divisions in AFSC.

Continued research in this area will eventually provide the information necessary to enable the DOD and industry to make great strides in strengthening our defense industrial base.

Conclusions

It is apparent from this research that the IMIP is having a positive impact on the defense industrial base. The significance of the impact is still a point for debate. The IMIP is doing the job it was intended to do; however, the impact has been limited due to the scope of the program. Increased funding and more effective management of the program is necessary if the program is to have a significant impact on improving the defense industrial base. It is unrealistic to expect that IMIP could have the results anticipated without the required funding and manpower support to effectively manage such an important program.

If the DOD actively supports the IMIP and provides the resources necessary to manage this program, there is no reason the Industrial Modernization Incentives Program cannot significantly improve the ailing U.S. defense industrial base.

Appendix A. Introductory Correspondence



DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OH 45433-6583

REPLY TO
ATTN OF LSG

SUBJECT Interview -- Industrial Modernization Incentives Program

TO

1. Thank you for agreeing to participate in my research, which is directed toward determining the effectiveness of the Industrial Modernization Incentives Program (IMIP). As we previously discussed, the purpose of this interview is to record your views on the status and effectiveness of the program. I would like to again emphasize that your responses will be kept strictly confidential.

2. I am a candidate for the degree of Master of Science in Contract Management in the School of Systems and Logistics. My research is being sponsored by Major Curtis Cook, PhD, Assistant Professor, Department of Systems Acquisition Management.

3. A list of definitions and interview questions is attached for your review prior to the interview. It would be helpful if you had these attachments available during the interview.

4. Once again, thank you for your cooperation. If you have any questions, please contact me at (513) 255-5435/4437 (Commercial) or 785-5435/4437 (AUTOVON).

DAVID S. GLOWACKI, Capt, USAF

2 Atch

1. Definitions
2. Interview Questions

STRENGTH THROUGH KNOWLEDGE

Definitions

(The following definitions are taken from the Glossary of Acquisition Management Acronyms and Terms and the 1986 Production Base Analysis.)

Acquisition - The process for obtaining systems, equipment or modifications to existing inventory items.

Effectiveness - The extent to which the goals of the system (program) are attained, or the degree to which a system (program) can be expected to achieve a specific set of mission requirements.

Industrial Base - The capability of industry to respond to the needs of and produce items for DOD or other buyers.

Mobilization - Involves the significant expansion of the defense industrial base through a combination of expanding existing producers and converting nondefense producers.

Extensive disruption of peacetime activities may be required.

Productivity - The actual rate of output or production per unit of time worked.

Surge - Involves rapid increases in production relying on existing capability and may involve one or more critical defense items. Surge assumes maintenance of peacetime economic activities: no declaration of national emergency, and no disruption of the civilian economic activity.

IMIP INTERVIEW QUESTIONS

1. What is the current status of your program (i.e. phase, cost, lead times, funding ratio)

(For the following questions, answer as they affect both your specific program and the defense industry as a whole.)

2. Has IMIP reduced program acquisition costs?
3. Has IMIP increased or decreased program productivity?
4. Has IMIP accelerated the development of state of the art technology through technology transfer?
5. Has IMIP increased surge/mobilization capabilities?
6. Has IMIP reduced critical materials usage?

(For the following questions, answer as they affect the defense industry as a whole.)

7. Do you feel that IMIP is restricting competition on DOD acquisitions?
8. Do you think that defense contractors are delaying modernization efforts in hopes of obtaining IMIP funding?
9. Is IMIP an effectively managed program? Do you have any recommendations for program improvement?
10. Should IMIP be expanded and funds increased? If not, why?
11. Do you think greater controls should be placed on defense contractors to account for IMIP funding?
12. Should defense contractors be required to shoulder more of the financial burden to revitalize the industrial base?
13. Given the restrictive nature of DOD acquisition policy and regulations, do you think it is possible for defense contractors to profitably upgrade their facilities without IMIP funding? Why or why not?

14. Is IMIP effective in strengthening the industrial base?
15. Do you have any other comments or suggestions?

Appendix B. Draft Business Agreement

H-XX-Industrial Modernization Incentives Program (IMIP)

I. Introduction

This special provision is incorporated herein in consideration for the Industrial Modernization Incentives Program (IMIP) at the contractor's facility located at _____. This provision describes the framework under which the contractor and the Government agree to negotiate the Productivity Savings Reward (PSR) attributable to the contractor's investment in modern, cost-effective production equipment and technology. It describes the program scope, PSR plan, and other terms and conditions.

II. Scope

A. The (Government) plans to invest up to a level of \$ _____ (then-year dollars) from fiscal year _____ through fiscal year _____ for the phase I, top-down factory analysis (and/or) the phase II design, development, and demonstration of modern, cost-effective manufacturing improvements and methods (enabling technologies) at _____.

B. The contractor plans to invest up to a level of \$ _____ (then-year dollars) from fiscal year _____ through fiscal year _____ for the phase I, top-down factory analysis and for the phase II design, development, and demonstration of modern, cost-effective manufacturing improvements and methods (enabling technologies).

C. In return for the above (Government) technology investment funding and other incentives that may be offered as specified in this special provision, the contractor has agreed to perform all work required by the statement of work, dated _____, and other terms and conditions of this contract. In addition, the contractor agrees to invest in modern, cost-effective manufacturing improvements (including but not limited to capital equipment, software, and related systems required to implement IMIP projects in phase III) up to a level of \$ _____ (then-year dollars for capitalized and non-capitalized items/tasks) from fiscal year _____ through fiscal year _____. This investment is over and above the normal capital investments necessary to support anticipated production requirements for DOD programs, and is not intended to displace the level of investments that would normally be made to meet those anticipated production requirements. In addition, this investment is over and above the contractor's five year capital investment plan in effect on _____.

D. The contractor's investments described in paragraph C above are subject to the following:

1. Realization of technically acceptable results to both the Government and the contractor from the design, development, and demonstration efforts of each specific phase II Project.

2. For all such investments, realization of a satisfactory Return-On-Investment (ROI), taking into account any incentive (including PSR) to be provided by the Government under this special provision.

3. Approval by the Contracting Officer (CO) of the contractor's phase III proposal and negotiation of and agreement to a PSR arrangement applicable to each approved phase III proposal.

E. It is understood that the contractor shall provide modern, cost-effective manufacturing improvements as defined in sections B. and C. above for each specific project in accordance with the following:

1. Items of equipment subject to the provisions of this clause will be documented in each specific phase II proposal and incorporated into attachment I when phase II negotiations are complete. Changes to items identified on attachment I shall be accomplished in accordance with the "Changes" clause of this contract.

2. The item(s) of equipment must be verified as severable, non-real property and must be within the definition of facilities as defined in FAR 45.301.

F. The Government agrees to provide a PSR to the contractor from the negotiated gross savings pool when such incentives are necessary for the contractor to earn a satisfactory return on capital investment to include non-reimbursed phase I, phase II, or phase III costs, whether or not capitalized. The PSR will be incorporated in applicable DOD programs after each specific project is fully implemented. (See paragraph III.E.) In any event, contractor PSR shall not exceed gross savings for that payment period or in total.

III. Productivity Savings Reward (PSR) Plan

A. Phase III Proposal

Each contractor request for PSR from the Government shall be submitted as a phase III implementation proposal. Each phase III implementation proposal shall contain as a minimum the following:

Volume I	Capital Equipment Documentation
Volume II	Savings Documentation
Volume III	PSR Calculation Documentation

1. Volume I. The contractor shall provide, as a minimum, the following for each project:

a. The nomenclature, quantity, scheduled on line date (release to manufacturing), effectivity by contract and unit for each item of capital equipment to be acquired.

b. The cost of each item of equipment to be acquired by fiscal year. This shall include costs of equipment, transportation, installation, and any associated costs to be capitalized in accordance with approved disclosed accounting practices. In addition, development costs and other expenses, whether or not capitalized, may be included in the investment baseline.

c. The estimated utilization of each piece/set of equipment shall be identified for the production of each major program.

2. Volume II. The contractor shall provide, as a minimum, the following for each project:

a. An "AS IS" (before IMIP) cost projection that, based on current methods, processes, materials, tooling, equipment, labor standards, and cost history, establishes a cost baseline against which to measure IMIP project cost improvements. All applicable cost elements (direct labor standards, variance, scrap, rework, yield, materials, indirect labor, overhead, etc.) with associated hours, dollars, and percentages will be individually shown for the products and operations to be impacted by the project.

b. A "TO BE" (after IMIP) cost projection which accounts for the impact of IMIP on all applicable cost elements for the products and operations to be impacted by the project. All applicable cost elements with associated hours, dollars, and percentages will be individually shown.

c. A breakdown of savings by fiscal year and by DOD program. In addition, the contractor shall provide a summary of commercial savings by fiscal year.

d. The method for calculation and allocation of savings shall be documented and presented in accordance with subsection III.C. below and shall be consistent with the contractor's disclosed accounting procedures.

3. Volume III. The contractor shall provide necessary computations to establish the appropriate PSR applicable to each project included in volume I. The discounted cash flow model in Table I shall be used to complete these computations:

a. The contractor's Internal Rate of Return (IRR) without any additional Government incentive beyond that authorized under formal Government contracting practices. This IRR is computed by finding the discount rate which, when multiplied by the after tax net cash flow, will approximate zero.

b. The amount of financial incentive (PSR) required by the contractor in order to achieve the acceptable IRR necessary for the contractor to fund the investment.

(1) When computing the IRR, contractor cost for developing projects, whether or not capitalized, may be included in the investment baseline provided such costs are not charged to overhead accounts. The Government will accept and, in fact, encourage contractor-funded development efforts under the terms and conditions established herein, and recognize a higher IRR, if warranted, due to increased contractor risk.

(2) Acceptable IRR is defined as the amount of financial incentive (PSR) required by the contractor in order to achieve the corporate hurdle rate in effect at the time of investment (currently %).

B. Submission of Above Documentation

1. The contractor shall submit copies of the phase III implementation proposal to the CO and concurrently to the Administrative Contracting Officer (ACO). The Government shall process proposals expeditiously; however, the Government shall not be liable for any delay in acting upon any proposal submitted in accordance with the contract. If the Government does not accept the contractor's proposal within its effective period, the contractor may withdraw, extend, or revise the proposal.

2. The proposal may be submitted at any time after the pre-implementation assessment completion.

3. The CO and contractor shall enter into negotiations to establish the PSR between the two parties.

4. The results of the negotiation(s) shall be stated in attachment II by modification to this contract and shall include the agreed upon PSR and methods for applying the PSR for each project or group of projects.

C. Measurement/Verification of Savings

The contractor shall develop a Government approved savings verification procedure that measures projected savings in accordance with the phase II statement of work. This verification procedure must be compatible with the methodology employed in making "AS IS" and "TO BE" estimates. The contractor shall collect and maintain supporting data sufficient to verify the savings claimed. Estimating methodology will be consistent with generally accepted industrial engineering and accounting procedures. Time study, methods time measurement, or equivalent is required for establishing direct labor baseline hours. Government verification of savings may occur up to the end of the contractor payback period.

D. Production Contract Adjustment

1. Adjustment of contract price shall be accomplished after the Government verifies the validity of savings estimates (volume 2 of the phase III implementation proposal) and after negotiation of the required contractor PSR.

2. Savings Identification

a. Price Competitive Proposals. The contractor will not be required to itemize savings in program proposals which will be competitively priced and do not require a certificate of current cost or pricing data. It will be assumed that the contractor will retain all IHIP related savings on these programs for purposes of the discounted cash flow analysis.

b. Proposals Supported with Cost Data. After implementation of an IMIP project, each DOD production and spare parts contract proposal shall be priced incorporating the applicable IMIP savings in accordance with P.L. 87-653. Each of these DOD proposals shall include a section identifying the IMIP projects incorporated in the price baseline and the amount of savings applicable to that lot buy. To the extent that IMIP projects are implemented during the term of the production contracts but were not used as factors in pricing such contracts, the contract price will be adjusted downward by a mutually negotiated amount based upon anticipated savings applicable to such programs.

3. Note: Two PSR Payment Options are available.

a. Option 1 Protected Sharing

PSR Payment. The _____ production contract(s) shall be the vehicle for contractor recovery of PSR. Method of PSR payment will be either through establishment of a separate line item or by increasing the contract target profit by the amount of the negotiated PSR. The agreed upon PSR will be paid to the contractor in the amounts and time period established in attachment II.

b. Option 2 Sharing Factor

PSR Payment. Each and every DOD production and spare parts program contract, with exception of those programs described in 2.a. above, shall be the vehicle for contractor recovery of PSR. Method of PSR payment will be by applying a "PSR factor" to all proposed work under the above mentioned programs until the full PSR amount is paid. However, in no event will the "PSR factor" be applied in excess of five (5) years. The PSR magnitude and payment methodology will be definitized during each phase III negotiation. As stated in paragraph III.B.4., the results of these negotiations shall be stated in attachment II by modification of this contract.

IV. Others Terms and Conditions

1. The IMIP focal point designated for this modernization program is _____ . This IMIP focal point, with the aid of representatives from each participating program office, will be responsible for project approach, program direction, negotiation of the PSR, and coordination of the "PSR factor" (if applicable).

2. Unless otherwise specifically provided in this contract or subsequent contracts, the Government shall not be obligated to restore or rehabilitate any property or facilities of the contractor which may be damaged by the installation, use, removal, or storage of the equipment except any such damage as may be occasioned by the negligence of the Government, its agents, employees, or independent contractors.

3. The contractor shall hold full title to the items of equipment acquired at its own expense and shall bear the risk or loss of destruction thereof or damage thereto.

4. Unless otherwise directed in writing by the CO under this contract, the contractor shall give priority in the use of the modernization equipment, listed in the contract modification(s) described in section E. above, to perform participating program office contracts. Moreover, the contractor shall not undertake any work involving the use of this equipment which would interfere with the performance of participating program office contracts.

5. The contractor warrants that ongoing DOD program schedules and delivery requirements will not be delayed as a result of participation in the IMIP program. In addition, the contractor warrants that his ability to meet all DOD program contractual specifications and performance criteria will not be degraded as a result of participation in the IMIP.

6. The contractor shall not be entitled to any adjustment due to the inability to earn the maximum dollar incentive (PSR) on the basis that the contractor implements the project late, or projects do not perform as estimated.

7. The CO shall make all reasonable efforts to provide appropriate adjustments where warranted, but the Government shall not be liable if such adjustment cannot be provided due to the lack of valid production requirements or because sufficient funds are not appropriated and available. The choice of appropriate remedies shall be determined by the CO.

EXAMPLE

CAPITAL EQUIPMENT LISTING

<u>PROJECT TITLE AND EQUIPMENT DESCRIPTION</u>	<u>QTY</u>	<u>ACQUISITION VALUE *</u>	<u>IMPLEMENTATION DATE</u>	<u>DOO PROGRAM EFFECTED</u>	<u>ANTICIPATED SAVINGS</u>
--	------------	--------------------------------	--------------------------------	-----------------------------	----------------------------

1. TITLE:

a.

b.

c.

d.

2. TITLE:

a.

b.

c.

d.

* To include implementation costs such as transportation, installation.

ATTACHMENT 1

**PHASE III NEGOTIATION(S)
SUMMARY**

PROPOSAL NO.: _____

APPLICABLE PROJECTS:

	<u>BENEFITS FLOW</u>				<u>TOTAL</u>
	<u>PT1</u>	<u>PT2</u>	<u>PT3</u>		
<u>PROGRAM</u>	<u>SAVINGS</u>	<u>INCENTIVE</u>	<u>SAVINGS</u>	<u>INCENTIVE</u>	<u>SAVINGS</u>
1.					<u>INCENTIVE</u>
2.					
3.					
4.					

ATTACHMENT 2

Appendix C. Interview Participants

Air Force Participants:

1. Bowers, Charles. Telephone Interview. HQ ESD/PLMP, Hanscom AFB MA 01731, 29 Jul 1988.
2. Brooks, Frederick. Personal Interview. HQ AFSC/PLMI, Wright-Patterson AFB OH 45433, 26 Jul 1988.
3. Byrnes, Capt Paul. Telephone Interview. HQ ESD/PLMP, Hanscom AFB MA 01731, 25 Jul 1988.
4. Clary, Major Dale. Personal Interview. HQ ASD/YZD, Wright-Patterson AFB OH 45433, 1 Aug 1988.
5. Dickinson, Lt Col Timothy. Personal Interview. AFWAL/MLTI, Wright-Patterson AFB OH 45433, 25 Jul 1988.
6. Hansen, Capt Richard. Personal Interview. HQ ASD/YPM, Wright-Patterson AFB OH 45433, 25 Jul 1988.
7. Heroux, Richard. Telephone Interview. HQ ESD/PLMP, Hanscom AFB MA 01731, 29 Jul 1988.
8. Karmis, Michael. Telephone Interview. HQ ESD/PLMP, Hanscom AFB MA 01731, 22 Jul 1988.
9. Lombard, Carl. Personal Interview. AFWAL/MLT, Wright-Patterson AFB OH 45433, 18 Jul 1988.
10. Scharmen, Pat. Telephone Interview. HQ AD/YMD, Eglin AFB FL 32542-5320, 22 Jul 1988.

Industry Participants:

11. Carlberg, Douglas. Telephone Interview. Hughes Aircraft Company, PO Box 1137, Tucson AZ 85734, 29 Jul 1988.
12. Duvall, Scott. Telephone Interview. Pratt & Whitney Aircraft Company, 400 Main Street, East Hartford CT 06108, 27 Jul 1988.
13. Ellis, James. Telephone Interview. Raytheon Company, 20 Syon St, Box 12 West, Waltham MA 02254, 1 Aug 1988.

14. Engwall, Richard. Telephone Interview. Westinghouse Electric Corp., 9200 Berger Road, Columbia MD, 29 Jul 1988.
15. Martin, Lawrence. Telephone Interview. General Dynamics Corp., PO Box 748, Fort Worth TX 76101, 25 Jul 1988.
16. Malaborski, Ronald. Telephone Interview. Ladish Company. 5481 S. Packard Ave., Cudahy WI 53110, 22 Jul 1988.
17. McCaffrey, Lloyd. Telephone Interview. Williams International, 2280 W. Maple Road, Walled Lake MI 48088, 29 Jul 1988.
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Vita

Captain David S. Glowacki [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] Upon

graduation he received an appointment to the USAF Preparatory School in Colorado Springs, CO. Upon graduation from the USAF Prep School, he entered the United States Air Force Academy in June 1976 and received his commission and graduated on 28 May 1980. He was initially assigned to the Sacramento Air Logistics Center, Directorate of Contracting and Manufacturing at McClellan AFB, CA as a contract negotiator until November 1983. In December 1983 he was assigned to the 4400 Contracting Squadron at Langley AFB, VA where he served as a contracting officer and the chief of the Unique Requirements Acquisition Branch until April 1987. During this period, Capt Glowacki also attended Squadron Officers School in residence, where he was selected as a distinguished graduate. He entered the Air Force Institute of Technology in May 1987.

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Thesis Advisor: Curtis R. Cook, Ph. D., Maj, USAF
Assistant Professor
Department of Systems Acquisition Management

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WILLIAM A. MAUER *W. A. Mauer* 17 Oct 88
Associate Dean
School of Systems and Logistics
Air Force Institute of Technology (AU)
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The reluctance of the defense industry to modernize its manufacturing capabilities has caused a serious degradation of the defense industrial base. In an effort to revitalize the declining industrial base, the DOD initiated the Industrial Modernization Incentives Program (IMIP). The short term goals of the IMIP are to reduce acquisition costs and lead times and improve quality levels through productivity gains. In addition, the long term goal of this program is to strengthen the defense industrial base to support surge and mobilization requirements.

Though the IMIP and its predecessor TECHMOD have been in existence since the late 1970's, a comprehensive evaluation methodology has not yet been developed. There have been several efforts to develop a comprehensive approach; however, they have all fallen short in constructing a satisfactory evaluation method. The major problem is there are several subjective criteria that must be evaluated to determine the success of a program. This subjectivity has made it difficult to provide a comprehensive assessment of an IMIP project.

This difficulty has lead to constant debate over the success of the IMIP. This research, however, is designed to quell this on-going debate. The goal of this research is to explore the perceptions of the "experts in the field" to determine the effectiveness of the IMIP and possible improvements to this program. Through a series of interviews with selected "experts", a comprehensive picture of the status of this program will be drawn.

Results of the survey revealed that the IMIP is a necessary program that is improving the industrial base. However, the program is of limited effectiveness due to the restricted scope of the current effort. Findings also indicate that the program should be centralized and procedures standardized in order to provide for the efficient and effective allocation of the scarce manpower and financial resources.

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